Spring 1-1-2020

SET 420-102: Geographic/Land Information Systems

Huiran Jin

SET 420 – Geographic/Land Information Systems (GIS/LIS)

Spring 2020

LECTURE **LAB**	Wed 6 pm – 9 pm at GITC 1400 Sat 9 am – 3 pm at GITC 2315A
INSTRUCTOR CONTACT	Dr. Huiran Jin huiran.jin@njit.edu (973) 596-3249
OFFICE HOURS	Wed 11 am – 2 pm at GITC 2514 (or by appointment)
COURSE STRUCTURE	(3-3-4) (lecture hr/wk - lab hr/wk - course credits)
COURSE DESCRIPTION	Geographic/Land Information System (GIS/LIS) builds on the core competencies that were introduced in the course "Introduction to Surveying". This course focuses on understanding the fundamentals of GIS/LIS and Multi-Purpose Cadastres. Topics on LIS emphasize issues related to the design, implementation, and maintenance of land records. Topics on GIS emphasize GIS data models (vector vs. raster) and database development for applications in diverse fields like criminal justice, economics, and infrastructure. Students will learn to use industry-standard GIS software packages for analyzing spatial patterns in social, economic, environmental and geologic data, and for generating cartographic output from the analysis.
PREREQUISITE(S) COREQUISITE(S)	SET 307 or MET 205 or permission of instructor.
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required
TEXTBOOK & REQUIRED MATERIALS	*A.* J.R. Jensen & R.R. Jensen. 2012. *Introductory Geographic Information Systems (1st edition).* Pearson. B. K. Chang. 2015. *Introduction to Geographic Information Systems (8th edition)*. McGraw-Hill Education. C. P. Bolstad. 2012. *GIS Fundamentals: A First Text on Geographic Information Systems (4th edition)*. XanEdu Publishing Inc. D. Text provided by the instructor.

COMPUTER USAGE	ArcGIS, Microsoft Word, Excel, etc.
CLASS TOPICS	Introduction to GIS/LIS, Georeferencing, Data Collection, Data Quality, Data Models and Databases, Data Analysis, Network Analysis, Data Measurements, 3-Dimensional Data, GIS-based Modeling, Cartography, etc. A project involving components of spatial or image analysis is an integral part of the course. Term projects will be given to the class during the lecture period. It may follow, but will not be limited to, the protocol set below.
COURSE LEARNING OUTCOMES (CLO)	By the end of the course students should be able to: 1. Understand the fundamental concepts of GIS/LIS and their differences from other types of information systems. 2. Demonstrate the use of industry-standard GIS software packages and GIS tools to perform basic GIS analyses and data transformation, and to produce cartographic outputs. 3. Theoretically and experimentally handle GIS database design. 4. Write an effective laboratory/survey report. 5. Present orally technical information in a professional and concise manner. 6. Perform assignments and deliver quality work on time according to the dates stipulated on the course outline, and demonstrate continuous improvement in the quality of assignment submissions. 7. Effectively interact with other team members to analyze GIS/LIS related problems and complete assignments. 8. Identify the uses of GIS/LIS beyond Surveying. 9. Demonstrate the use of computer programming skills (i.e. SQL) to perform DBMS (Database Management Systems) searches.
STUDENT OUTCOMES	The Course Learning Outcomes (CLO) support the achievement of the following SET Student Outcomes and TAC of ABET Criterion 9 requirements: (a) an ability to select and apply the knowledge, techniques, skills, and modern tools of their disciplines to broadly-defined engineering technology activities; Related CLO – 1 (c) an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes; Related CLO – 1, 2, 3, 4 (e) an ability to function effectively as a member or leader on a technical team; Related CLO – 6 (h) an understanding of the need for and an ability to engage in self-directed continuing professional development; Related CLO – 8

(i) an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;
Related CLO – 3, 8
(j) a knowledge of the impact of engineering technology solutions in a societal and global context;
Related CLO – 8
(k) a commitment to quality, timeliness, and continuous improvement.
Related CLO – 6

GRADING

Participation	5 %
Lab	20 %
Project	20 %
Midterm	25 %
Final	30 %

A	> 90
B+	82–89.9
B	75–81.9
C+	70–74.9
C	65–69.9
D	60–64.9
F	< 60

IMPORTANT NOTES:

A. Attendance to every lab is mandatory. Lab reports are due by the date specified on the handouts. Unless approved by the instructor before the deadline, late submission will not be accepted/graded and a zero will be assigned automatically.
B. Lab reports should only be submitted electronically through CANVAS. Details on how you derived your answers must be shown.
C. No makeup Midterm/Final exams will be provided unless students' absence is approved by the Dean of Students.
D. Adjustments on the letter grade assignment and/or curving of the final scores might be applied based on the overall performance of the class.

ACADEMIC INTEGRITY

NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course with an "F" plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted. For more information on the honor code, go to http://www.njit.edu/academics/honorcode.php.

MODIFICATION TO COURSE

The Course Outline below may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be

notified in advance of any changes to the outline.

COURSE OUTLINE Hybrid. Lectures on WebEx are displayed in red.

Week	*Date*	*Lecture* (GITC 1400 or ONLINE)	*Lab* (GITC 2315A)	*Reading*
1	1/22	Introduction to GIS		Ch. 1
2	1/29	Georeferencing		Ch. 2
3	2/5	Data for GIS		Ch. 3
4	2/15		Spatial Data Models and Databases Lab #1	Ch. 5
5	2/19	Data Quality		Ch. 4
6	2/29		Spatial Analysis of Vector and Raster Data Lab #2	Ch. 6
7	3/4	Spatial Analysis of Vector and Raster Data (Cont.) Review for Midterm		
8	**3/11**	**Midterm Exam**		
9	**3/18**	**Spring Recess (No Class)**		
10	3/28		Network Analysis Lab #3	Ch. 7
11	4/1	Statistics and Spatial Data Measurements Proposal Presentation		Ch. 8
12	4/8	Spatial Analysis of 3-d Data		Ch. 9
13	4/18		Project Progress Report Lab #4	
14	4/25		Cartography using a GIS Lab #5	Ch. 10
15	4/29	Project Presentation Review for Final		
16	**5/6**	**Reading Day 1 (No Class)**		
17	**5/13**	**Final Exam**		